

SPECIFICATION AMENDMENTS

On page 1, above line 1, insert--Field of the Invention--

On page 1, above line 5, insert--Background of the Invention--

Paragraph at line 5 of page 1 has been amended as follows:

-- Commercially available blends of petroleum derived gas oil and Fischer-Tropsch derived gas oil are known. For example, commercial transportation fuel formulations have been on the market, which comply with the requirements of the California Air Resources Board (CARB), and which formulations are based on a blend of gas oil as obtained in the Shell MDS Fischer-Tropsch process operating in Bintulu (Malaysia) and petroleum derived gas oils.--

Paragraph at line 14 of page 1 has been amended as follows:

--It is furthermore known that petroleum derived gas oils generally have ~~generally~~-a lower cetane number than gas oils derived from a Fischer-Tropsch process.--

Paragraph at line 17 of page 1 has been amended as follows:

-- From various publications, it is assumed that the cetane number of the final blend will comply with linear blending rules. See, for example, recent patent publication WO-A-0183648. This publication discloses that Fischer-Tropsch fuels can "upgrade" conventional fuels as predicted from simple, linear blending of the fuel parameters, i.e., as specified in "Fischer-Tropsch Wax Characterization and Upgrading Final Report" by P. P. Shah, G. C. Sturtevant, J. H. Gregor and M. J. Hurnbach, US Department of Energy, Subcontract DE-AC22-85PC80017, June 6, 1998. Furthermore, from the results, as illustrated in above referred to WO-A-0183648, one would conclude linear blending rules with regard to cetane number. --

Paragraph at line 8 of page 2 has been amended as follows:

-- A problem with Fischer-Tropsch derived gas ~~oil~~ oils is that they are not widely available and that the cost of preparing such gas oils is believed to be higher than the cost of preparing petroleum derived gas oil for the foreseeable future. There is thus a

continuous drive to minimize the amount of Fischer-Tropsch derived gas oil in such a blend while meeting the different final product specifications.--

Paragraph at line 16 of page 2 has been amended as follows:

-- ~~Applicants have now surprisingly found the following~~ It would be useful to find a more optimised method to upgrade a petroleum derived gas oil to a gas oil blend having a target cetane number using Fischer-Tropsch derived gas oil. --

On page 2, above line 20, insert--Summary of the Invention--

Paragraph at line 20 of page 2 has been amended as follows:

-- The invention is directed to a method ~~Method~~ to increase the cetane number of a gas oil product based on a petroleum derived gas oil to a target cetane number Y by adding to the petroleum derived gas oil a volume amount of a Fischer-Tropsch derived gas oil having a higher cetane number, B, than the petroleum derived gas oil of cetane number, A, wherein the volume amount of added Fischer-Tropsch derived gas oil is less than the volume amount which would be added if linear blending is assumed.--

On page 2 above line 29, insert--Detailed Description of the Invention--

Paragraph at line 10 of page 4 has been amended as follows:

-- The cetane number of the petroleum derived gas oil and the Fischer-Tropsch derived gas oil as used in the method according to the invention may be measured according to the normal ASTM D613 method. Because such a method is cumbersome when performing the blending method according to the invention in a refinery environment a more preferred method is by measuring the cetane number by near infrared spectroscopy (NIR) as for example described in detail in US-A- Pat No. 5349188 which is hereby incorporated by reference. Such measurements will include the use of a correlation between the measured spectrum and the actual cetane number of the sample. The underlying model is made by correlating the cetane number according to ASTM D613 of a wide variety of petroleum derived samples, Fischer-Tropsch derived gas oil samples and/or their blends with their near infrared spectral data. --

Paragraph at line 26 of page 4, ending at line 3 of page 5, has been amended as follows:

-- Preferably, the method according to the invention is embedded in an automated process control of the blending operation in, for example, a refinery environment. Such a process control may use so-called quality estimators which will provide, by making use of a model, a real time prediction of the cetane number of the resulting blend from readily available raw process measurements, such as for example the cetane numbers as measured by NIR and the volumetric flows. Even more preferably, such a quality estimator is calibrated on-line by making use of, for example, the method described in detail in WO-A-0206905. --

Paragraph at line 4 of page 5 has been amended as follows:

-- The Fischer-Tropsch derived gas oil may be any gas oil, which is prepared from the synthesis product of a Fischer-Tropsch synthesis. The gas oil product may be obtained by fractionation of such a Fischer-Tropsch synthesis product or obtained from a hydroconverted (hydrocracking/hydroisomerisation) Fischer-Tropsch synthesis product. Examples of Fischer-Tropsch derived gas oils are described in EP-A-583836, WO-A-9714768, WO-A-9714769, WO-A-011116, WO-A-011117, WO-A-0183406, WO-A-0183648, WO-A-0183647, WO-A-0183641, WO-A-0020535, WO-A-0020534, EP-A-1101813 and US-A-Pat No. 6204426 all of which are hereby incorporated by reference.--

Paragraph at line 15 of page 5 has been amended as follows:

-- Suitably, the Fischer-Tropsch derived gas oil will consist of at least 90 wt%, more preferably at least 95 wt% of iso and linear paraffins. The weight ratio of iso-paraffins to normal paraffins will suitably be greater than 0.3. This ratio may be up to 12. Suitably, this ratio is between 2 and 6. The actual value for this ratio will be determined, in part, by the hydroconversion process used to prepare the Fischer-Tropsch derived gas oil from the Fischer-Tropsch synthesis product. Some cyclic-paraffins may be present. By virtue of the Fischer-Tropsch process, the Fischer-Tropsch derived gas oil has essentially zero content of ~~sulphur~~ sulfur and nitrogen (or amounts which are no longer detectable). These hereto-atom compounds are poisons for Fischer-Tropsch catalysts and are removed from the synthesis gas that is the feed for the Fischer-Tropsch process. Further, the process does not make aromatics, or as usually operated, virtually no aromatics are produced. The

content of aromatics as determined by ASTM D 4629 will typically be below 1 wt%, preferably below 0.5 wt% and most preferably below 0.1 wt%.--

Paragraph at line 3 of page 6 has been amended as follows:

-- The Fischer-Tropsch derived gas oil will suitably have a distillation curve which will, for its majority, be within the typical gas oil range: between about 150 °C and 400 °C. The Fischer-Tropsch gas oil will suitably have a T90 wt% of between 340-400 °C, a density of between about 0.76 and 0.79 g/cm³ at 15 °C, a cetane number greater than 70, suitably between about 74 and 82, and a viscosity between about 2.5 and 4.0 centistokes at 40 °C. --

Paragraph at line 11 of page 6 has been amended as follows:

-- The petroleum derived gas oils are gas oils as obtained from refining and optionally (hydro)processing of a crude petroleum source. The petroleum derived gas oil may be a single gas oil stream as obtained in such a refinery process or it may be a blend of several gas oil fractions obtained in the refinery process via different processing routes. Examples of such different gas oil fractions as produced in a refinery are straight run gas oil, vacuum gas oil, gas oil as obtained in a thermal cracking process and light and heavy cycle oil as obtained in a fluid catalytic cracking unit and gas oil as obtained from a hydrocracker unit. Optionally, a petroleum derived gas oil may comprise some amount of a petroleum derived kerosene fraction.--

Paragraph at line 25 of page 6, ending at line 20 of page 7, has been amended as follows:

-- The straight run gas oil fraction is the gas oil fraction; which has been obtained in the atmospheric distillation of the crude petroleum refinery feedstock. It has an Initial Boiling Point (IBP) of between 150 °C and 280 °C and a Final Boiling Point (FBP) of between 320 °C and 380 °C. The vacuum gas oil is the gas oil fraction as obtained in the vacuum distillation of the residue as obtained in the above referred to atmospheric distillation of the crude petroleum refinery feedstock. The vacuum gas oil has an IBP of between 240 °C and 300 °C and a FBP of between 340 °C and 380 °C. The thermal cracking process also produces a gas oil fraction; which may be used in step (a). This gas oil fraction has an IBP of between 180 °C and 280 °C and a FBP of between 320 °C and 380 °C. The light cycle oil fraction as obtained in a fluid catalytic cracking process will

have an IBP of between 180 °C and 260 °C and a FBP of between 320 °C and 380 °C. The heavy cycle oil fraction as obtained in a fluid catalytic cracking process will have an IBP of between 240 °C and 280 °C and a FBP of between 340 °C and 380 °C. These feedstocks may have a ~~sulphur~~ sulfur content of above 0.05 wt%. The maximum ~~sulphur~~ sulfur content will be about 2 wt%. Although the Fischer-Tropsch derived gas oil comprises almost no sulphur it could still be necessary to lower the ~~sulphur~~ sulfur level of the petroleum derived gas oil in order to meet the current stringent low ~~sulphur~~ sulfur specifications. Typically the reduction of ~~sulphur~~ sulfur will be performed by processing these gas oil fractions in a ~~hydrodesulphurisation~~ hydrodesulfurization (HDS) unit.--

Paragraph at line 21 of page 7 has been amended as follows:

-- Gas oil as obtained in a fuels hydrocracker ~~has~~ suitably has an IBP of between 150 °C and 280 °C and a FBP of between 320 °C and 380 °C. --

Paragraph at line 24 of page 7 has been amended as follows:

-- The cetane number of the (blend of) petroleum derived gas oil (fractions) as described above is preferably greater than 40 and less than 70. Apart from increasing the ~~this~~ cetane number of the petroleum derived gas oil, other properties of the blend need to meet the required specifications. Examples of such properties are the Cloud Point, CFPP (cold filter plugging point), Flash Point, Density, Di+-aromatics content, Poly Aromatics and/or distillation temperature for 95% recovery.--

Paragraph at line 1 of page 8 has been amended as follows:

-- Preferably, the final blended gas oil product comprising the Fischer-Tropsch and the petroleum derived gas oil will have a ~~sulphur~~ sulfur ~~+~~ content of at most 2000 ppmw (parts per million by weight) ~~sulphur~~ sulfur, preferably no more than 500 ppmw, most preferably no more than 50 or even 10 ppmw. The density of such a blend is typically less than 0.86 g/cm³ at 15 °C, and preferably less than 0.845 g/cm³ at 15 °C. The lower density of such a blend as compared to conventional gas oil blends results from the relatively low density of the Fischer-Tropsch derived gas oils. The above fuel composition is suited as fuel in an indirect injection diesel engine or a direct injection diesel engine, for example of the rotary pump, in-line pump, unit pump, electronic unit injector or common rail type.--

Paragraph at line 16 of page 8, ending at line 18 of page 9, has been amended as follows:

-- The final gas oil blend may be an ~~additised~~ additized (additive-containing) oil or an ~~unadditised~~ unadditized (additive-free) oil. If the fuel oil is an ~~additised~~ additized oil, it will contain minor amounts of one or more additives, e.g. one or more additives selected from detergent additives, for example those obtained from Infineum (e.g., F7661 and F7685) and Octel (e.g., OMA 4130D); lubricity enhancers, for example EC 832 and PARADYNE 655 (ex Infineum), HITEC E580 (ex Ethyl Corporation), VELTRON 6010 (ex Infineum) (PARADYNE, HITEC and VELTRON are trademarks) and amide-based additives such as those available from the Lubrizol Chemical Company, for instance LZ 539 C; dehazers, e.g., alkoxylated phenol formaldehyde polymers such as those commercially available as NALCO EC5462A (formerly 7D07) (ex Nalco), and TOLAD 2683 (ex Petrolite)(NALCO and TOLAD are trademarks); anti-foaming agents (e.g., the polyether-modified polysiloxanes commercially available as TEGOPREN 5851 and Q 25907 (ex Dow Corning), SAG TP-325 (ex OSi), or RHODORSIL (ex Rhone Poulenc))(TEGOPREN, SAG and RHODORSIL are trademarks); ignition improvers (cetane improvers) (e.g., 2-ethylhexyl nitrate (EHN), cyclohexyl nitrate, di-tert-butyl peroxide and those disclosed in US-4,208,190 at column 2, line 27 to column 3, line 21); anti-rust agents (e.g., that sold commercially by Rhein Chemie, Mannheim, Germany as "RC 4801", a propane-1, 2-diol semi-ester of tetrapropenyl succinic acid, or polyhydric alcohol esters of a succinic acid derivative, the succinic acid derivative having on at least one of its alpha-carbon atoms an unsubstituted or substituted aliphatic hydrocarbon group containing from 20 to 500 carbon atoms, e.g., the pentaerythritol diester of polyisobutylene-substituted succinic acid); corrosion inhibitors; reodorants; anti-wear additives; anti-oxidants (e.g., phenolics such as 2,6-di-tert-butylphenol, or phenylenediamines such as N,N'-di-sec-butyl-p-phenylenediamine); and metal deactivators.--

Paragraph at line 19 of page 9 has been amended as follows:

-- The additive concentration of each such additional component in the ~~additivated~~ additized fuel composition is preferably up to 1 %w/w, more preferably in the range from 5 to 1000 ppmw, advantageously from 75 to 300 ppmw, such as from 95 to 150 ppmw.--

Paragraph at line 27 of page 9 has been amended as follows:

-- In this Example, use is made of a petroleum derived gas oil and two Fischer-Tropsch derived gas oils in the absence of any additives (FT1 and FT2) having the properties as listed in Table 1. The cetane number was measured according to the CFR Cetane Engine method, ASTM D 613. --

Table 1 of page 10 has been amended as follows:

Table 1

	Petroleum derived gas oil	Fischer-Tropsch derived gas oils	
PROPERTIES		FT1	FT2
DENSITY @ 15 °C			
(IP365/ASTM D4052) g/cm ³	0.8503	0.776	0.7782
DISTILLATION			
(IP123/ASTM D86)			
IBP °C	201.0	183.5	186.5
10%	244.0	214.1	216.5
20%	259.5	228.4	234.0
30%	270.5	243.6	247.0
40%	281.0	259.5	261.0
50%	290.0	275.4	273.0
60%	299.5	291.2	285.0
70%	309.5	306.9	297.5
80%	321.0	322.9	310.5
90%	337.5	340	324.5
95%	351.0	351.3	333.5
FBP	363.5	359	339.5
CETANE NUMBER ASTM D613	51.1	77.3	75.8
Kinematic viscosity at 100 °C (cSt)		3.103	2.665
(IP71/ASTM D445)			
SULPHUR SULFUR (IP373) ppm M	400	0	<5
CARBON wt%	86.9	84.9	84.6
HYDROGEN wt%	13.2	15	15

Paragraph at the bottom of page 10 and ending at line 3 of page 11 has been amended as follows:

-- In order to increase the cetane number of 51.1 of the petroleum derived gas oil to a target cetane number Y as listed in Table 2 different amounts of Fischer-Tropsch derived gas oil FT1 had to be added. From Table 2 it is clear that this amount is less than the volume, which would have been added if linear blending were assumed. --

On page 12 above line 1 insert --We claim:--